Application to the NBER Digital Economics and AI Tutorial

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Graduate Study and Research Interests

I am a fifth-year Finance PhD student at the University of Minnesota Twin Cities. My doctoral training includes empirical and theoretical corporate finance; discrete-time, continuous-time, and empirical asset pricing; banking; microeconomics; macroeconomics; econometrics; and industrial organization.

My research examines how information, technological change, and competition shape firms' investment and innovation decisions. I am particularly interested in how AI affects firms' innovation strategies, market entry, and competition. My current work uses the pharmaceutical industry to study these questions by following research activity from patenting to drug development and linking these outcomes to firms' scientific workforces.

Ongoing Research

AlphaFold2 and Drug Innovation

In joint work with Roham Rezaei, Tomislav Ladika, and Richard Thakor, I study how publicly available AI tools affect innovation and entry in the pharmaceutical industry. Specifically, we examine the release of AlphaFold2 protein-structure predictions in July 2021. Our central question is whether new AI technology enables firms to pursue new drug development and changes the advantages associated with their existing research capabilities.

We link Cortellis drug-development histories to protein structures, patent records, and Revelio employment histories. To measure firms' potential gains from AlphaFold2, we use information on the share of each protein's amino-acid residues that lacked prior experimental structural coverage. This approach accounts for previously available structures of both the protein itself and closely related proteins. We then construct firm exposure using drug portfolios and examine subsequent innovation using difference-in-differences analyses.

Preliminary estimates using this exposure measure indicate relative increases in new-drug activity among firms with greater exposure. Separate analyses show increased patenting and more firms patenting for the first time on proteins with limited structural information before AlphaFold2's release. Drug-development results vary across exposure definitions, and we are investigating how the information provided by AI translates into different forms of innovative activity.

Our employment analysis also shows that firms expand their employment of AI and machine learning engineers working on protein-structure prediction following AlphaFold2's release. This finding suggests that access to publicly available AI tools is accompanied by investment in specialized human capital. We are further examining how these workforce adjustments relate to firms' drug-development outcomes and existing experimental research capabilities.

Dissertation: How Acquisitions Shape Rival Innovation: Evidence from Drug Development

My job market paper examines how pharmaceutical acquisitions affect rival firms' innovation and market entry. I investigate how acquisitions signal a market's commercial potential while altering its competitive structure. Using longitudinal drug-development and acquisition data, I study rivals' decisions to initiate new projects, advance existing projects, and enter markets. This project connects to my AI research through a broader interest in how changes in information and competition affect investment in innovation.

Interest in the Tutorial

The tutorial would be particularly valuable as I develop the AlphaFold project and my broader research agenda on AI and firm investment. I would welcome discussions about measuring economically relevant exposure to AI, identifying the effects of publicly available scientific knowledge, and understanding how firms combine AI tools with specialized human capital. Learning from researchers and other graduate students would help me refine the empirical design and connect the project to broader questions about innovation, scientific labor, and market competition.

Dissertation advisor: Professor Richard T. Thakor

Committee members: Prof. Richard T. Thakor; Prof. Pinar Karaca-Mandic; Prof. Andrew Winton